

METHOD AND APPARATUS FOR COMBINED MEASUREMENTS OF  
CONCENTRATION, DISTRIBUTION AND FLOW VELOCITY OF SUSPENDED SOLIDS

Abstract of the Disclosure

A remote sensor and associated data processor, performs concurrent analysis of backscattered signals from a multi-beam acoustic Doppler emitter/receiver positioned against the inside wall of a conveying pipe or channel. Range-gating of the return signals allows independent analysis of discrete volumes of backscattered signal data corresponding to the distribution, concentration and travel velocity of small individual volumes or bins of water and suspended solids. Velocity is derived from the measured Doppler frequency shift for each bin. Relative solids concentration is estimated as a function of the measured intensity of the backscattered signals. The intensity data are calibrated by inputting site-specific environmental information, such as temperature, salinity, acoustical system constant, backscattered signal interpretation ratio between concentration and particle size, and concurrently measured concentration values obtained from physical sample collection and previous laboratory analysis into the analytical computer program. The program uses iterative routines that adjust calibration parameters using data obtained from the previous measurement on an adjacent layer in a continuous self-correcting process. The apparatus and method provide both historical and real-time measurements of distribution, concentration and velocity of suspended solids in a flow of piped or channeled liquid.